

REMARKS

At the outset, the applicant wishes to express his appreciation to the Examiner for the helpful suggestions pertaining to formal matters in the application.

By the present amendment, the applicant has rewritten the drawing descriptions as suggested by the Examiner in the Office Action. Also, the applicant has amended the claims by cancelling Claims 3 and 4 and incorporating their limitations into Claims 1 and 2, respectively. Claim 1 has further been amended to more definitely point out that the structural member includes reinforcing fibers other than carbon fibers as well as reinforcing fibers which are carbon fibers according to the specifics indicated. Claim 7 has been amended to indicate that the plastic reinforcing fibers are selected from the indicated group at page 6, lines 19 to 21, of the instant specification. Claims 1, 2 and 5 to 7 have been amended by replacing the abbreviation "FRP" with "fiber reinforced plastic" thereby overcoming the Examiner's objection thereto.

In the Office Action, the Examiner rejected claims 1 to 6 as being anticipated under 35 U.S.C. 102(b) by U.S. Patent No. 5,916,682, to *Horii, et al*, granted June 29, 1999. The Examiner specifically refers to Column 1, lines 61 to 67, which discusses the molded shapes of the structures; Column 2, lines 42 to 51, which discusses the use of unidirectional prepreg sheets including

those of pitch-based carbon fibers having specified tensile modulus; Column 3, lines 26 to 32, which discusses the use of prepreg sheet comprising PAN-based carbon fibers having specified tensile modulus; and Column 4, lines 6 to 19, which discusses arranging the reinforcing fibers oriented in the axial direction of the structure and other reinforcing fibers oriented at an inclined angle to the axial direction.

Initially the applicants believe that it would be helpful to briefly explain the present invention. The purpose of the invention is to provide a fiber reinforced plastic structural member which advantageously incorporates carbon fibers together with reinforcing fibers other than carbon fibers whereby higher vibration dampening, lighter weight, higher rigidity at low production costs are the result when compared with the prior art wherein only non-carbon reinforcing fibers were used in such structural members. The resulting structural member uses 95% to 75% by mass of conventional non-carbon reinforcing fibers, such as glass fibers, aramid fibers, polyethylene fibers and mixed fibers, which are low in cost and carbon fibers in the ratio of 5% to 25%. Specifically, as defined in Claims 1 and 2, carbon fibers having a high tensile modulus are laminated at the outermost layers of the structural member so as to enhance the rigidity and vibration dampening property of the structural member while maintaining production and molding costs low. The shear deformation of the

structural member in a site vertical to the neutral surface is suppressed and the bending rigidity of the structural member is improved by laminating carbon fibers as indicated in Claims 5 and 6.

Turning now to the *Horii et al* reference therein is disclosed a carbon fiber reinforced composite material. As clearly indicated in the title of the *Horii et al* reference, in the Abstract thereof, and throughout the specification and claims thereof, the disclosure is concerned solely with a structure formed from carbon fibers without the use of non-carbon reinforcing fibers. Nowhere in the *Horii et al* reference is there a disclosure of the combined use of carbon reinforcing fibers and reinforcing fibers other than carbon reinforcing fibers. Therefore, it is respectfully submitted that amended claims 1, 2, 5 and 6 are not anticipated by the *Horii et al* reference since the respective laminated structures are not the same or similar.

Next, in the Office Action, the Examiner rejects original claim 7 as being obvious under 35 U.S.C. 103(a) over the *Horii et al* reference in view of the state of the art acknowledged by the applicant in the instant specification. The Examiner maintains that the primary *Horii et al* reference discloses the use of carbon reinforcing fibers substantially as claimed but "does not disclose the use of other fibers with the carbon fibers in the amount claimed." The Examiner then states that the applicants disclose

that fibers other than carbon fibers are used in structural members because of their low cost and therefore it would have been obvious to replace some of the carbon fibers in the primary reference with the non-carbon fibers of the secondary reference. Further, the Examiner maintains that "adjusting the amount of non-carbon fibers in the article to 5 to 25% to provide the desired cost savings and structural properties is within the purview of one of ordinary skill in the art in the absence of unexpected results." The applicant first wishes to point out that it is the carbon fibers which are in the range of 5 to 25% and not the non-carbon fibers as stated by the Examiner.

As can easily be discerned from the *Horii et al* reference, it is concerned with carbon fiber reinforced composite materials used in relatively small structures such as golf club shafts, fishing rods, robot arms and the like (Patent, Column 1, lines 10 to 11; Column 2, lines 10 to 11). On the other hand, the present invention relates to structural members such as beams, columns, girders and the like as stated in the specification at page 1, lines 9 to 14. To construct such large scale structural members from carbon fiber reinforced composite material would be and would have been prohibitively expensive. Thus it is stated in the instant specification at page 6, lines 23 to 25, that glass fibers and aramid fibers are preferably used in such large scale members. Thus, it is apparent that the Examiner has things exactly backwards

in stating that some of the carbon fibers of *Horii et al* could be replaced with non-carbon fibers. The present invention replaces some of the non-carbon reinforcing fibers in prior art structural members with strategically positioned carbon reinforcing fibers so as to enhance the rigidity and vibration dampening property of the structural member while keeping the cost and weight low. There is no hint or suggestion in the cited *Horii et al* reference that the carbon fiber reinforced composite material thereof should be or could be combined with the non-carbon fiber reinforcing material of structural members. There is, in fact, no mention or reference whatsoever in *Horii et al* to structural members such as are contemplated by the present application. Thus, there is no recognition in *Horii et al* of the problem sought to be corrected or overcome by the present invention since the reference does not relate in any manner to structural members. In re Wright, 6 U.S.P.Q.2d 1959 (CAFC 1988). The only recognition of the problem sought to be overcome by the present invention is given by the applicants in the instant application which obviously cannot be relied on by the Examiner for the purposes of obviousness.

In view of the above, it is respectfully submitted that the claims remaining in the application, Claims 1, 2 and 5 to 7 are neither anticipated by U.S. Patent No. 5,916,682 nor obvious over U.S. Patent No. 5,916,682 in view of applicant's acknowledged state

of the art and should therefore be allowed. Such action is respectfully solicited.

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